4023.

SUPREME COURT OF THE UNITED STATES,

No. 153.

GEORGE W. AND HENRY SIZER, PLAINTIFFS IN ERROR,

vs.

WILLIAM V. MANY.

IN ERROR TO THE CIRCUIT COURT U. S. FOR MASSACHUSETTS.

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UNITED STATES, *ss:*

The President of the United States to the judges of the circuit court holden in and for the district of Massachusetts, greeting: [SEAL.]

Because that, in the record and process, and also in the rendering of judgment in a suit before you, or some of you, between William V. Many, plaintiff, and George W. Sizer and Henry Sizer, defendants, in a plea of the case, a manifest error has intervened to the great damage of the said Sizer and Sizer, as in his complaint has been stated. And as it is just and proper that the error, if any there be, should be corrected in due manner, and that full and speedy justice should be done to the parties aforesaid in this behalf, you are hereby commanded, that, if judgment thereof be given, then under your seal you do distinctly and openly send the record and process in the suit aforesaid, with all things concerning them, and this writ, so that you have the same before the Chief Justice and the associate Justices of the Supreme Court of the United States on the first Monday of December next, at Washington, being the present seat of the National Government, that the record and process aforesaid being inspected, they may cause to be done thereupon what of right ought to be done.

Allowed by

P. SPRAGUE, *Judge.*

Witness, the honorable Roger B. Taney, esquire, Chief Justice of the said Supreme Court, at Washington aforesaid, this eighth day of June, in the year of our Lord one thousand eight hundred and fifty-three, and of the independence of the United States the seventy-seventh.

H. W. FULLER, *Clerk.*

UNITED STATES OF AMERICA,
District of Massachusetts, ss:

At a circuit court of the United States, for the first circuit, begun and holden at Boston, within and for the district of Massachusetts, on Monday, the sixteenth day of October, in the year of our Lord, one thousand eight hundred and forty-eight, the fifteenth day being Sunday.

Before the honorable Levi Woodbury, associate justice, Peleg Sprague, district judge.

WILLIAM V. MANY, of Albany, in the State of New York, and a citizen of that State,
vs.
GEORGE W. SIZER and HENRY SIZER, both of Springfield, in the State of Massachusetts, and citizens of said State.

In a plea of trespass on the case, for that whereas heretofore, to wit: on the seventeenth day of March, in the year eighteen hundred and thirty-eight, letters patent, bearing date on the day and year last aforesaid, signed by John Forsyth, Secretary of State, and countersigned by Henry L. Ellsworth, Commissioner of Patents, and bearing the seal of the Patent office, were duly issued; reciting that whereas Samuel Truscott, George Wolf, and James Dougherty, of Columbia, Penn., have alleged that they have invented a new and useful improvement in the mode of making cast-iron wheels to be used on railroads, and applicable to other purposes, which they state have not been known or used before their application; have made oath that they are citizens of the United States, and that they do verily believe that they are the original and first inventors or discoverers of the said improvement, and that the same has not, to the best of their knowledge and belief, been previously known or used; have paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose; and thereupon there was granted, by said letters patent, according to law, to the said Samuel Truscott, George Wolf, and James Dougherty, their heirs, administrators, or assigns, for the term of fourteen years from the seventeenth day of March, eighteen hundred and thirty-eight, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of said Samuel Truscott, George Wolf, and James Dougherty, in the schedule thereunto annexed, and is made a part of the said letters patent; all which said recitals, in the said letters patent contained, the plaintiff avers to be true; and afterwards, to wit: on or about the third day of August, in the year eighteen hundred and thirty-nine, the said Samuel Truscott and James Dougherty did, by their deed of that date, assign to the said George Wolf and one Frederick Bancher, otherwise called Frederick Bangher, of said borough of Columbia, in the State of Pennsylvania, all the right, title, and interest which they had in the said invention, as secured to them by said letters patent for, to, and in the United States of America, for and during the full term for which said letters patent are or may be granted; reserving, nevertheless, one manufacturing right thereof in one establishment to each of them, (the said Samuel Truscott and James Dougherty,) not to be used, erected, or carried on within one hundred miles of the borough of Columbia, in the county of Lancas-

er, and State of Pennsylvania aforesaid. And the said Frederick Bangher did, by his deed, dated the twenty-eighth day of April, eighteen hundred and forty-seven, assign all his right, title, and interest in and to the said invention to the said George Wolf. And the said Samuel Truscott did, by his deed, dated the twenty-sixth day of May, eighteen hundred and forty-seven, assign to the said George Wolf all his right, title, and interest in the said reserved right to use the said invention as set forth in the deed from said Truscott and Dougherty, to the said Wolf and Bancher, dated the third of August, eighteen hundred and thirty-nine; and afterwards, to wit: on the eleventh day of June, eighteen hundred and forty-seven, by an agreement of two parts made by and between the said George Wolf and the plaintiff, duly executed and dated on the day and year last aforesaid, the said George Wolf did transfer, assign, grant, sell, release, convey, and confirm to the plaintiff the said invention, the said discovery, the said improvement, the said letters patent, and the rights, franchises, privileges, and benefits therein and thereby granted, fully, absolutely, and to all and every extent possible, intent and purpose whatsoever, the said one right to manufacture wheels according to the said patent reserved by the said James Dougherty excepted; and afterwards, to wit: on the eighteenth day of February, eighteen hundred and forty-eight, the said James Dougherty did, by deed of that date, through Samuel Trescott, his attorney in that behalf, duly appointed, transfer, assign, and set over to the said George Wolf, his, the said Dougherty's, one manufacturing right reserved to himself in and by the said deed from the said Truscott and Dougherty to the said Wolf and Bancher, dated the third day of August, eighteen hundred and thirty-nine, as aforesaid. And the said George Wolf did, by his deed, dated on the eighteenth day of February, eighteen hundred and forty-eight, transfer, assign, and set over to the plaintiff, the said one reserved manufacturing right last above mentioned, as fully and completely as the same was on the said eighteenth day of February vested in him, the said George Wolf; all which said letters patent, deeds, and other instruments of assignment, hereinbefore mentioned, have been and are duly recorded in the Patent office of the United States at Washington, whereby the plaintiff became possessed of and entitled to all the property, right, and interest in and to the said invention, under and by virtue of the said letters patent, and the subsequent deeds, and other instruments of assignment, to the plaintiff as aforesaid. And the plaintiff avers that afterwards, to wit: on the eighth day of June, eighteen hundred and forty-eight, and on sundry days and times before, during the said term of fourteen years mentioned in said letters patent, and before the purchase of this writ at Springfield, to wit: at said Boston, the said defendants, well knowing the premises, did make and vend to others to be used, divers, to wit: three thousand cast-iron wheels to be used on railroads, constructed substantially like the cast-iron wheels patented as aforesaid, in violation and

infringement of the exclusive right so secured to the plaintiff by said letters patent, and the subsequent deeds and other instruments of assignment to the plaintiff as aforesaid, and contrary to the form of the statutes of the United States in such case made and provided, whereby the plaintiff has been greatly injured, and deprived of great profits and advantages which he might and otherwise would have derived from said invention, and from the assignment of the said letters patent to him as aforesaid, and has sustained actual damage to the amount of twelve thousand dollars; and by force of the statutes aforesaid, an action has accrued to him to recover the said actual damage, and such additional amount, not exceeding, in the whole, three times the amount of such actual damage as the court may see fit to order and adjudge. Yet the said defendants, though requested, have never paid the same or any part thereof to the plaintiff, but have refused and yet refuse so to do, to the damage of the said plaintiff, as he says, the sum of thirty thousand dollars.

And now, at this present term, the said George and Henry come and defend the wrong and injury, when, &c., and for plea say that they are not guilty in manner and form as the plaintiff in his declaration hath alleged against him, and of this they put themselves upon the country for trial by

BATES, BEACH, & GILLETT,
Their attorneys.

And the plaintiff doth the like by

B. R. CURTIS,
His attorney.

And the defendants, for specification under the statutes in that behalf provided, give notice to the plaintiff that, under the general issue, they shall give evidence in the trial of the cause, that the description and specification filed by the said assignee of the said William V., the plaintiff, in the Patent office, does not contain the whole truth relative to his said intention and discovery; that it does contain more than is necessary to produce the described effect; that the assignors of the said plaintiff were not the original and first inventors or discoverers of the said article patented, or of a substantial or material part thereof claimed as new; that the same had been in public use and on sale with the consent and allowance of the assignors, the patentees, before the application of said patentees for a patent, and they name the following persons and places of residence of those by whom they intend to prove that they had a prior knowledge of the thing patented and the places where the same had been used, viz:

Names.	Residence.	Where used.
Richard Imlay.....	New York City.	Harlem R. R., New York.
Saml. B. Dougherty...	do.	Do. and N. Y. R. R., N. Y.
Henry R. Dunham...	do.	Harlem R. R., N. Y.
John Brant.....	Piermont, N. Y.	Piermont, N. Y.
Perry James.....	New Rochelle.	West Chester co., & N. Y.
Ariundus Tiers.....	Philadelphia.	Philadelphia.
John Murphy.....	do.	Pennsylvania.
John D. Norris.....	do.	do.
W. W. Baldwin.....	do.	do.
Asa Whitney.....	do.	do.
George Burt.....	Wilmington, Del.	Wilmington,
Lobdell.....	do.	do.
John S. Perry.....	Albany, N. Y.	Albany.
A. T. Pierce.....	Norwich, Conn.	Norwich.
Egbert Hedge.....	Brooklyn, N. Y.	Brooklyn,
W. A. Wheeler.....	Worcester, Mass.	Worcester.
Geo. I. King.....	Springfield, do.	Springfield.
H. C. Buckley.....	do. do.	do.
D. D. Warner.....	do. do.	do.
N. C. Judson.....	do. do.	do.

Richard Inlay knew of two-plate wheels were made and used before 1838.

Samuel B. Dougherty to prove that plate wheels were made and used before 1838.

John Brant to prove that plate wheels were used previous to 1838.

Perry James to prove that plate wheels were used previous to 1838.

Henry R. Dunham made wheels with two plates previous to 1838.

Ariundus Tiers made plate wheels, John Murphy fitted car wheels for use, John D. Morris has seen plate wheels (two) previous to 1836.

M. W. Baldwin has seen two-plate wheels made previous to 1838.

Asa Whitney has seen plate wheels made previous to 1838. To testify that two-plate wheels of the same form of Truscott, Wolf, and Dougherty, were made previous to 1836 by Ariundus Tiers, and that they are not the original inventors; and also that they proved a fail ure, and not equal to others that were made, and that they have not gone into general use as many others have.

Bush and Lobdell, Wilmington, Del.,

John S. Perry, Albany, N. Y.,

to testify as above in respect to failure of wheels.

BATES, BEACH, & GILLETT,

Defendants' attorneys by R. Choate.

The defendants would add to the list of witnesses already filed the following named persons, with their places of residence.

Samuel Truscott, Columbia, Lancaster Co., Pa.
James Dougherty, do. do.
William Moffet, do. do.
David Cackly, do. do.
Walter McQueen, Albany, New York.
W. C. Young, Schenectady, do.
Mr. Eaton, car-builder, Troy, do.
Thomas Tustin, Schuylkill 8th, above Arch st., Philadelphia, Pa.

Boston, September 29th, 1848.

A. McARTHUR,
Attorney for defendants.

Additional Specification, filed November 25th, 1848.

The defendants would add to the list of witnesses already filed the following named persons, with his place of residence, for the purpose of proving that plate wheels, like those of plaintiffs, for railroad cars, were known and made before the invention and patent of the plaintiff.

Robert Fry, Philadelphia, Penn.: That such wheels were made at said Philadelphia, in the year 1835 or 1836.

ARTHUR McARTHUR,
Attorney for defendants.

Issue being joined as aforesaid, the cause, after a full hearing, is committed to a jury, sworn according to law, to try the same, who, after hearing all matters and things concerning the same, return their verdict therein upon oath, that is to say: the jury find that the defendants are guilty in manner and form as the plaintiff hath above thereof declared against them, and assess damages in the sum of seventeen hundred and thirty-three dollars and seventy-five cents.

It is thereupon considered by the court, that the said William V. Many recover against the said George W. and Henry Sizer the sum of seventeen hundred and thirty-three dollars and seventy-five cents damages, and costs of suit taxed at .

Whereupon, exceptions to the opinion and ruling of his honor the judge, who tried this cause, in matters of law, being alleged by the said George W. and Henry Sizer, and reduced in writing, were presented to the said presiding judge, which, being found conformable to the truth, were allowed, and signed and sealed by him, and are in the words following, to wit:

4027.

CIRCUIT COURT UNITED STATES,
Massachusetts district, ss:

October term, 1848.

Before the honorable Peleg Sprague, district judge.

WILLIAM V. MANY
vs.
GEORGE W. SIZER et al.

This was an action for an alleged infringement for a patent right granted to Truscott, Wolf, and Dougherty, on the seventeenth day of March, A. D. 1838, for a new and *improvemed* mode of constructing cast-iron wheels for railroad cars, to which the defendants pleaded not guilty, and by their specification of defence denied,

First. The validity of said patent.

Second. The infringement.

And alleged two grounds of objection to the validity of the patent, to wit:

1st. That the patentees were not the first inventors of the thing patented, or a material and substantial part thereof.

2d. That the thing patented was not useful.

To maintain the validity of the patent, the plaintiff offered the original letters patent granted as aforesaid to Trescott, Wolf, and Dougherty, and the various mesne assignments by which he, on the 18th day of February, 1848, became possessed of the title thereto, the specification of which is as follows:

Trescott, Wolf, and Dougherty's specification.

The schedule referred to in these letters patent, and making part of the same:

To whom it may concern:

Be it known, that we, Samuel Trescott, George Wolf, and James Dougherty, of the borough of Columbia, in the county of Lancaster, and State of Pennsylvania, have invented a new and improved mode of constructing cast-iron wheels for railroad cars, and for other purposes, and we do hereby declare that the following is a full and exact description thereof: We denominate our wheel the "double plate car wheel," because we use two plates instead of the spokes or arms usually employed, which plates are cast with the rim, and from one substance therewith. We give to the rim of our wheels the same form in all respects as is now given to the rim of car wheels; but instead of arms, we cast our wheels with two parallel or nearly parallel plates, which plates are convex on one side, and concave on the other. The hub or nave which is to receive the axle is cast in the centre of these plates, extending from one of them to the other. The accompanying drawing gives a sectional view of one of our wheels, "a a"

being the rim, "b b" the front and back plates, convex on one side, and concave on the other, "c c" being the hollow or void space between them, and "d d" the nave or hub. The hollow "c c" between the two plates is formed by a core in the process of casting, which core is supported in the flach by leaving suitable holes in the plates for that purpose, which holes serve for the removal of the sand of which the core is formed.

We cast our rim in a chill in the usual manner, and in consequence of the particular form given to the plates, they contract in cooling without danger of fracture, and without it being necessary to divide the hub as is done when car wheels are cast with spokes or arms.

The only effect of contraction is to flatten the two plates in a slight degree, operating in this respect like the curved arms of many cast-iron wheels. We are aware that car wheels have been made with plates as a substitute for arms, but such plates have been made separate from the wheels, and united together by screwed bolts embracing the hub in a distinct piece between them.

The difference between such wheels and those constructed by us is so obvious as not to need *pointed* out.

What we claim as our invention, and wish to secure by letters patent, is the manner of constructing wheels for railroad cars, or for other purposes to which they may be applied, with double curved plates, one convex outwards, the other inwards, and an undivided hub, the whole cast in one piece, as herein fully set forth.

SAMUEL TRESCOTT,
GEORGE WOLF,
JAMES DOUGHERTY.

Columbia, Penn., January 13th, 1838.

Witness:

ALBRICHT LUNY,
THOMAS LOYD.

And further, in support of the novelty of said invention, the plaintiff offered the testimony of James Dougherty, one of the original patentees, whose evidence tended to prove, that, to cast a wheel like the one patented by them, a mould is formed in the usual way, except that, in order to chill or harden the rim or tread of the wheel, which is highly important, that part of the mould which forms the tread and called the chill, is made of some conductor of caloric, and for this purpose iron is generally used. The fluid metal is poured into the mould thus formed, the effect of which is to produce, in that part of the molten iron which comes in contact with the chill, a rapid cooling, causing it to crystallize and harden. The entire periphery being so chilled, the circumference is contracted. The shrinking of the periphery exerts a force from every point thereof towards the centre, and the interior of the wheel, by this force being condensed, must yield, and the plates rise in the centre so as to be sensibly observed, vary-

4028.

ing from $\frac{5}{16}$ to $\frac{3}{8}$ of an inch. As the wheel cools, the plates again subside to about their original position. Theoretically the arc is shorter, but not always so practically. By this construction of the wheel, provision is made for the two contractions—first, by permitting the plates to rise, when the first contraction caused by the chilling of the rim takes place; and the second, by the return of the plates to their original position as they contract in cooling. This witness further testified that they made their wheels from three different patterns, though they were all similar. In the first pattern, the lines of the plates from hub to rim might have been straight. The second pattern was like the model marked , though he thought the wheel was more dishing. In the third pattern the lines were almost straight.

(A model of a section of the wolf wheel was shown to witness by plaintiff's counsel, as to which he said:)

"This is a model of straight convex plates, and one of the forms in which we made our wheel. We made many wheels after this form; it contains the provision for compensation by the rising and settling of the plates. We discussed the subject, that it was immaterial whether the lines weres traight or bent, so long as the provision was made for the contractions," and we considered it immaterial, as those we made with straight convex plates were as good as any that we made. The plates being conical, makes the provision; that the contraction of the rim raises the whole hub with the plates, and in cooling they settle again.

Also, the deposition of Samuel Trescott, one of said patentees, tending to prove, that in the fall of 1837, deponent, in connection with James Dougherty, made castings, without a pattern, of a double plate car wheel, by taking a spoke wheel and moulding it in the ordinary way of moulding car wheels; after which, they removed the interior of the wheel, and placed in its stead a core to form the cavity or space between the two plates, which produced a wheel with the outside plate concave, and the back or inside plate convex, a solid hub and chilled rim; that the model, marked III, herewith produced, fairly represents said wheel; that the outside disc or plate of this model should be somewhat more concave; it would be a perfect model of the wheel so produced; that the advantages they expected to secure were the continuous support of the rim by the two plates—a solid hub, which they thought could not be obtained in any other wheel by reason of contraction, which car wheels are subject to, by being cast in chills, and the support to the hub. That the experiment was successful. That by reason of the form of the plates, as the rim contracted they were forced up, and yielded and sunk down again in cooling, and thus they overcame the difficulty of the contractions of the metal in the process of casting and cooling.

That they manufactured these wheels during the years 1838, 1839, and 1840. That the form of the first wheel was adopted in the subse-

quent ones without change in any essential particular, as "they found that the concave and convex plates were the thing."

Also, the deposition of George Wolf, the other patentee, tending to prove that they considered as part of their invention, the substitution of plates for spokes or arms; another portion of their invention, the construction of a solid hub in the place of a divided one; another part of the invention, to consist of the curved form of the plates; and that they considered the invention to consist, in addition thereto, of a combination of all these parts together, to be cast all in one piece.

The defendents, in support of the first ground of objection to the validity of the patent, viz: the want of novelty, offered in evidence a patent granted to John Elgar on the 19th day of November, 1833, the specification of which is as follows, to wit: Be it known that I, John Elgar, civil engineer, of the city of Philadelphia, have invented certain improvements in the wheels of railroad carriages, by one of which improvements they are made to adapt themselves more readily to curved roads than such as have heretofore been used for that purpose; and by the other, the construction is given to them which will render them more firm and durable than those now in general use; and I do hereby declare that the following is a full and exact description of my said improvement:

The self-adjusting conical wheel for running upon curved roads is well known to engineers, it having been made the subject of a patent by James Wright, and a modified form of it being now used on the Baltimore and Ohio railroad. The plan which I have devised is a new modification of this principle, by which some of the inconveniences which have hitherto attended its employment are in a great degree, if not altogether, obviated. Instead of making the wheel conical on its whole tread, like "Wright's," or of forming the conical part against the flanch and leaving the other part cylindrical, as in those used on the Baltimore road, I form the cone on the outer part of the tread of the wheel opposite to the flanch, leaving that part of the tread which extends from the flanch towards the opposite side, cylindrical or nearly so for one-half of its width, more or less, and then tapering out in such degree as may be found most convenient according to the curvature of that part of the road which has the smallest radius. The curved part of the road is adapted to these wheels by widening the track in proportion to the radius curvature, so as to admit the conical part to roll on the interior while the cylindrical part bears on the exterior rail. This construction obviates the objection arising from the wrong tendency of the core when running on the exterior rail, and adapts the wheel more perfectly to those parts of road which are straight, and produces other advantages will readily occur to experienced engineers. In order to render railroad wheels more firm and durable than those now in use, I form that part of the wheel usually occupied by the spokes of two plates of iron, preferring for this purpose thick sheet-iron of $\frac{3}{8}$ of an inch, more or less, in

thickness. These sheets of iron are raised so as to be concave or dishing, forming the segment of a large sphere, or, if preferred, they may be made conical.

These plates have a hole in their centres to receive the hub or nave, and have a flanch turned up over which the hoop of the hub may pass, or the hub may be secured in other ways if preferred. If the rim or tire is of wrought-iron, the plates may have a flanch turned at their peripheries, through which they may be riveted on the interior of the rim. When the rim is of cast-iron, the plates may be secured without a flanch, one being cast within the rim, against which the plates may fit on either side, rivets or bolts passing through them and through the flanch, to secure them in their places. Other modes of fixing the plates in their places may be devised; and I do not mean to confine myself to any specific plan of effecting this object, the manner of doing so not in any way affecting the principle upon which my improvement is founded.

What I claim as my invention, in my first described improvement, is making the wheel of a railway carriage conical on its outer edge, and cylindrical between such conical part and the flanch, for the purpose of adapting it to run on curved roads, and applying it thereto upon the principle and in the manner hereinbefore set forth.

What I claim as my invention, in my second described improvement, is the substituting of metallic plates (generally of wrought-iron) for the spokes usually employed, and giving to such plates a form which shall be convex, either curved or conical from the rim to the hub of the wheel.

(Signed) JOHN ELGAR.

Witnesses:

ROBERT CLARKE,
WILLIAM WALLIS.

Also a patent granted to Henry R. Dunham on the 18th day of February, 1838, the specification of which is as follows:

To all whom it may concern:

Be it known, that I, the undersigned, Henry R. Dunham, of the city, county, and State of New York, engineer and machinist, have invented a new and useful method or improvement in making locomotive engines and railroad car wheels, and I do hereby declare that the following is a full and exact description thereof:

This wheel I cast in an iron mould, and is properly called the chilled wheel, from the fact of being hardened on the entire periphery, caused by coming in contact with the iron mould at the time of casting it; but instead of continuing the arms of the wheel to the rim, as is now the case, and partly *annulling* that section of the rim to which it extends, I make two *sums*, the space between them being two inches, the same can be more or less, and continue the arms

of the wheel no further than the inner rim, thereby leaving an uninterrupted space, under the outer rim, of two inches, more or less, which give to the outer or chilled rim an even-tempered or chilled surface, (more durable, and not liable to flatten opposite the arms, obviating that difficulty in the wheels now in use,) the outer rim being connected by the sides or edges to the inner rim to which the arms of the wheel extend. The space between the inside and outside rim is made by the insertion of cores supported at intervals by cores in the usual manner.

What I claim as my invention or improvement, and desire to secure by letters patent, is the making of two rims connected at the sides, and leaving an uninterupted space under the outside rim, excepting where it is joined at the edges or sides of the wheel, and the said vacant or uninterupted space is represented by the drawing herewith sent, and is marked S on said drawing, extending entirely around the circumference of the wheel between the outer and inner rim, or, in other words, constituting a hollow felloe cast in one hollow connected mass entirely around said wheel, and the whole, it may be further remarked, is cast in an entire casting.

In testimony whereof, I, the said Henry R. Dunham, have hereunto subscribed my name in the presence of two witnesses, whose names are also hereunto subscribed on this eighteenth day of November, A. D. 1837.

HENRY R. DUNHAM.

Witnesses:

SAMUEL A. PORTER,
PHILANDER FISK.

The defendants also offered evidence tending to prove that William J. James, in 1834, and in the city of New York, invented and put in use, on the Harlam railroad, a railroad car wheel of the model marked . It consisted of a chilled rim and solid hub connected by a single plate, curved from rim to rim, all cast in one piece and at the same time, The provision for compensation in the process of cooling was the convex form of the plate, which permitted the hub to rise or fall with the plate; that this wheel was an economical and useful one, and continued in successful use on the Harlem road, until the year 1840, when Mr. James retired from business, and ceased to manufacture them. That some time previous to the year 1838, Mr. James added a ring under the outside edge of the tread, about 1½ inches deep, as shown in the model marked .

There was testimony tending to show that this addition to the wheel was as early as the year 1834, and there was also testimony tending to show that it was as late as 1838.

Also, the testimony of Robert J. Frye, that he was a pattern maker in the establishment of Mr. Baldwin, in Philadelphia, who built locomotive steam-engines and machinery generally; that under his directions, witness, in the year 1835, made the pattern accompa-

nying this bill of exceptions, and marked ; that said pattern was devised by Mr. Baldwin; that wheels were cast from it; that the first attempt was unsuccessful, one of the plates *craked*, because the core was not properly fixed in its place; that wheels were cast which had no perceptible fracture, but would not swear to any particular number; would not swear to more than two; did not try them to see if they were strained; had no knowledge of the amount of strain that did not exhibit itself by fracture; did not know that any of them were put in use and stood wear. They were cast at the foundry of Messrs. Parks, Tiers & Co., at Kensington, where there were employed 20 or 25 men, and delivered at Mr. Baldwin's shop. That witness had no recollection of their being put in any other place than where all the castings were put; that if they had been called for, they would have been shown; that Mr. Baldwin had from 60 to 100 men at that time.

That the Baldwin wheel had a chilled rim and solid hub, connected by two plates in one piece; that the plate of pattern are longer than a straight line; that the hub diminishes in length by cooling—the tendency is to shorten the plates, inasmuch as they are brought nearer together, and are in opposite directions; that it was his impression that one of the plates was curved, but was unable to say; but thought the principle of compensation by a bent plate was not in the Baldwin wheel. That a plate ought to bend between hub and rim as much as its thickness, otherwise the particles would separate, though there might not be a visible fracture; that the wheel produced in court was cast from this pattern, and had run 1,400 miles under a passenger car and was perfectly sound.

Also, that Mr. Arundius Tiers invented a cast-iron railroad car wheel like the model marked ; that said Tiers did not pursue the making of this wheel, because it required too much labor and was too expensive, because it did not please him when made, and because he had more profitable business; that all the wheels which he did make on this model had chilled rims and solid hubs, and were made with arms in the centre like the model, and were made as an experiment; and that he relinquished the experiment after making from 6 to 12, which cracked around the rim after they were cast from want of proper proportions between the plates and the rim, and not from the form of the plates; that they were never sold or put in use, so far as the said Tiers knew or believed, although they were made publicly at his establishment, and formed the subject of conversation with many persons who came in to look at them.

Also the testimony of experts, tending to show that the principle of the plaintiff's wheel was found in that of James', and that it did not require invention to pass from the one to the other.

The plaintiff introduced the testimony of experts, tending to prove that it did require invention to produce plaintiff's from the James wheel, as it contained a second plate, which introduced the principle of truss and brace, not found in that of James.

In support of the second ground of objection to the validity of the patent, viz: want of utility, the evidenee tended to show that the patentees made about 1,100 wheels, according to the models aforesaid, and the drawings annexed to the patent, between the date of their patent and the year 1842 or 1843, when they ceased to make them, and resumed the manufacture of spoke wheels to the number of 500 a year, and that they have never made any plate wheels since that time, nor were such wheels manufactured by any one until about the month of July, 1847, when the plaintiff purchased of the patentees their interest in the patent right. That the plaintiff caused, under his own supervision, about 1,200 of these wheels to be made, in conformity with the said models and drawings annexed to the patent, in the establishment of Jagger, Treadwell & Co., at Albany, as to which Wm. B. Treadwell, one of said firm, testified: We made machinery and railroad wheels at Albany; average two hundred and and seventy-five hands; have made from nine to twelve hundred Wolf wheels, from July, 1847, to January, 1848; the larger portion were made about September, very few so late as January. Mr. Many employed us to make them; he furnished orders from customers; workmen were good workmen; iron was the very best quality we could get. Mr. Many suggested the kind of iron, and we always got it, if possible; he visited the works from time to time, and examined the wheels; he was a founder, and a skillful one; often made suggestions; he had no other occupation than the management of this wheel; he resided near. The character of the wheel was such that we could not get a good chill and have it stand; if the chill was good they would crack on the inner plate; if the rim was softened to prevent their cracking, they would wear out and be returned on our hands; we always tried them, and if we found them too soft, we did not send them out, but broke them up; sometimes three, four or five or six cracked in a day, sometimes two or three; I generally superintended, the fore part of the time constantly, the latter part not so much; the "form of the crack indicated a strain on the outer plate; the cracks would open from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch; that indicates a strain."

There was testimony, also, tending to show that one in every six, on an average, of the wheels so made broke in casting, and that from 80 to 100 had been returned broken, cracked in use, and the manufacture of them stopped and abandoned ever since 1848, and they were no longer made by anybody; that they were considered unsafe under passsenger cars, and dangerous to human life; and that those who originally purchased the Wolf wheel never bought them the second time, but replaced those broken by wheels of other kinds.

The plaintiff introduced the testimony of James Dougherty, one of the patentees, who testified: That he believed that they never found any difficulty in casting their wheels when they would get the iron right; the plates gave no trouble, the difficulty was *was* in getting iron that would chill regularly; he had known plates to crack when

4031.

the iron was not right, and when the cores were not secured right; he knew of no number of wheels that they had broken—very small number in proportion to the whole number cast; he had the clearest recollection of casting about 200 wheels of good iron; as near as he recollected, not ten were lost in casting; as a matter of recollection, he would say they did not lose twenty; they knew the iron was well calculated for wheels. The furnace where they obtained it, afterwards changed to hot blast, and then could get no more iron that would chill. He did not know where the wheels went; supposed they went upon the roads in that neighborhood; a portion on the Susquehanna. From '39 to '43 had difficulty in getting iron, because of the introduction of hot blast in the furnaces throughout Pennsylvania; iron made by that process will not chill.

There was also testimony tending to show that some of the wheels made by the patentees, and also many of these made by the plaintiff, were still in use. Also, that the iron of which some of the wheels made by the plaintiff, in Albany, was of an inferior quality.

The plaintiff also introduced the evidence of Samuel Cummings, who testified that on the Old Colony railroad they had four wheels made after the Sizer pattern; one of them failed in July or August, 1847. The car ran off the track and broke the wheel on the outside plat, near the rim. Eight were put on in August, six had been taken off condemned, four of them were broken. From one to six wheels cracked before put on.

In May, 1848.....	26	Sizer wheels purchased.
" June, "	17	
" July, "	5	
" Sept. "	26	
" Oct. "	6	

Thirteen in hand now, which have never been fitted up; have been ordered not to fit them up.

It also appeared that these wheels were not made at the foundry of the defendants, nor under their direction, but at the foundry of Messrs. Algers, South Boston.

Upon the question of infringement, the plaintiff offered the testimony of experts, tending to show that in their opinion the wheel manufactured by the defendant was substantially like the plaintiff's, because, in comparing defendants' wheel with the models produced by plaintiff, of his wheel, and the drawings annexed to the patent, they found in each the principle of compensation to prevent fracture in the process of cooling by the agency of curvature.

The defendants' offered the testimony of experts, tending to show that although the principle of compensation was to be found in both the plaintiff's and defendants' wheel, yet the mode of applying it in the defendants' was substantially and entirely different from the mode employed by the plaintiff; that the curvature of the plates in defendants' wheel, from hub to rim, allowed the plates to readily adapt

themselves to the contractable forces exerted in the process of casting and cooling, and thus afford compensation successfully, by yielding thereto by their flexibility, and without strain upon the metal, and without disturbing the hub; while in the plaintiff's wheel the mass of the metal composing the plates being in a straight line from hub to rim, they would only adapt themselves to the changes that take place in the process, by being permitted, by their arrangement with reference to each other and the hub, to rise and fall together. That the general curvature of the plates did not contribute to compensation, except by raising the hub above the plane of the rim, and thus permitting the rising and falling of the hub and plates relied upon. That when curvature is relied upon, the curve should be between hub and rim, and as least as great as the thickness of the plate, and that the same amount of curvature employed in defendants' wheel, if embodied in the plaintiff's wheel, from rim to rim, according to the specification and drawings of plantiff's, would produce a distorted and comparatively worthless wheel.

The plaintiff introduce testimony tending to show that from actual experiment the hub and plates in the plaintiff's wheel, and also that patented by G. W. Eddy, did rise in the process of casting $\frac{1}{4}$ to $\frac{3}{8}$ of an inch and upwards, and subside in the process of cooling to their original position.

The defendants introduced testimony tending to show that by actual experiment the hub and plates in their wheel were stationary during the whole process of casting and cooling.

The defendants also offered in evidence a patent granted on the 17th day of March, 1838, to Jonathan Bonny, Charles Bush, and George G. Lobdell, the specification of which is as follows:

Be it known that we, Jonathan Bonney, Charles Bush, and George G. Lobdell, of Wilmington, and county of New Castle, and State of Delaware, have invented an improvement in the manner of constructing cast-iron wheels for cars, to be used upon railroads, and for other purposes, and we do hereby declare that the following is a full and exact description thereof:

The accompanying drawing shows a section of wheel, which, instead of arms, as is usually employed, has each face thereof convex, a hollow place being left between the two surfaces. The rim of the wheel A A does not differ from those usually employed, and is cast in a chill in the ordinary manner. The rim is united to the centre of hub of the wheel B B, by the two convex plates C C, which are each in one piece with the rim and hub. The interior D D, between the two convex face plates, is formed by cores supported in a way well known by iron-founders.

The hub has a transverse division, E E, which separates it into two distinct parts attached respectively to the two face plates. This division is necessary to prevent all the tension which would be produced by shrinkage in the casting, and which would endanger the

breaking of the wheel. The hub, if preferred, may be cast solid, with the exception of the division F, and afterwards bored out, or it may be cored and turned to receive the axle.

We are aware that wheels have been made with double convex plates, both of cast and of wrought iron; but such plates were in separate pieces from the rims and hubs, being received into rebates on the rims, and embracing the hubs between them, which extended through openings in their centres, the two plates being secured together by screw bolts. We are also well aware that a plan has been devised for cast-iron wheels with two-face plates, having a space between them formed by cores, as in our method; but the two plates were in this case parallel to each other, one of them being convex and the other concave on its face; the hub extending from one face to the other in a continuous piece, rendering it necessary, on account of shrinkage, to place the two plates as described—an arrangement which sacrificed strength to necessity.

By constructing the wheel so that the plates shall not be convex outwards, as they are in the position of the greatest strength, they may be made considerably thinner than would otherwise be admissible, and the wheel will consequently be lighter.

All that we claim as our invention is the division of the hub transversely between the two-face plates, each convex outwardly, in the manner and for the purpose set forth.

JONATHAN BONNEY,
CHARLES BUSH,
GEORGE G. LOBDELL.

Witnesses:
THOS. S. MERRITT,
W. MCCAULLY.

Also a patent granted on the 26th of December, 1845, to George W. Eddy, the specification of which is as follows:

To all whom it may concern:

Be it known, that I, George W. Eddy, of Waterford, in the county of Saratoga, and State of New York, have invented a new and improved mode of constructing cast-iron wheels for railroads, and other purposes, by which the said wheels may be founded or cast without breaking or cracking, or being liable afterwards to break or crack from strains generated within them while being made, or during the act of cooling within the mould; and I do hereby declare that the nature of my invention is fully set forth in the following description, accompanying drawing or drawings, letters, figures, and references thereof. My improvement is applicable to cast-metal wheels alone.

Fig. 1 on the said drawing denotes an elevation of the inner side of my improved cast-iron wheel.

Fig. 2 is a transverse and central section of it; and

Fig. 3 is another and similar section of a wheel—will be hereafter described. The said wheel is composed of a cast-iron rim A, and hub B, united together by two plates C D, as seen in figures 1 and 2. In the above respects the wheel does not differ from many in common use. My improvement is to be found in the manner in which the plate D is made, the same having an undulating or serpentine shape in cross section, as seen at a b c d e, in figure 2. The plate C, or outer plate of the wheel, is what is termed a convex plate in contradistinction to a concave plate which is made dishing towards the centre of the axis of the hub of the wheels, and when the plate D has been made convex in the opposite direction, it has become necessary in casting the wheel to divide or separate the hub B into two parts, (as will be seen by reference to certain letters patent granted on the seventeenth day of March, of the year 1838, to Messrs Bonney, Bush, and Lobdell, of Wilmington, in the State of Delaware;) otherwise the strains upon the hub in opposite directions caused by shrinkage of the rim in cooling (while being founded) would be so great as to break the hub or plates, or otherwise seriously injure the wheel, so as to render it generally unfit for safe usage.

By making either the outer or inner plate of an undulating or irregular shape, as seen in section , fig. 2, and the outer plate concave or convex, the former will readily contract in opposite directions, as it cools under the contractile force of the chilled rim, and in so doing will not oppose any counteracting force to that which is generated in a lateral direction, by the contraction of the convex or concave plate; therefore no separation or division of the hub will become necessary; consequently I am enabled, by thus making the plates of a wheel, to render it very much stronger in its hub than when made with two convex plates whose convexities stand in opposite directions. In connection with the undulating plate D, the other plate C may made undulating, as seen in the figure 3. Both plates, when so made, will readily yield to the contraction of the rim, and will cool without breaking themselves, or either of them, or the hub.

Although I obtain a great advantage in being able to cast the hub solid, with the exception of the hole which receives the axle, yet I do not intend to confine my invention to the solid hub alone, as by using the undulating plate or plates, even when a divided hub is used, I render the whole much less liable to being fractured or broken when founded than when made with concave plates, or concave and convex plates, *on* convex plates alone.

I do not claim the manner of constructing a cast-iron or metal railway-car wheel, by making it of two convex or concave plates, or one convex and one concave plate united to a solid hub, or a divided hub and a circular rim and flanch, as heretofore made; but that which I do claim, is my improved manner of constructing a wheel, by which I am enabled to cast it with a solid hub, and in other respects as I

have above set forth, viz: by making it with an undulating plate in combination with a concave or convex plate, or another undulating plate, as herein described.

In witness whereof, I have hereto set my signature this 23d day of August, A. D. 1845.

GEORGE W. EDDY.

Witnesses:
G. D. SMITH,
D. B. KING.

The defendant also offered in evidence a patent for a railroad-car wheel granted to them on the 17th day of April, 1847, the specification of which is as follows:

Sizer's Patent.

To whom it may concern:

Be it known, that we, George W. Sizer and Henry Sizer, of Springfield, in the county of Hampden, and State of Massachusetts, have invented an improvement in the manner of constructing cast-iron wheels for cars to be used upon railroads, and for other purposes; and we do hereby declare that the following is a true and exact description thereof: The accompanying drawings show sections of the different combination of plates in making wheels according to our plan. The rim does not differ from *thence* usually employed, and are cast in chills in the ordinary manner. The rim is united to the hub of the wheel C C by the different plates, as represented in the figures 1, 2, 3, of the accompanying drawings, fig. 1. The rim and hub are united by the combination of two plates D and E, one concave outwardly and the other straight from the rim to the hub, which may be cast solid or divided transversely, as wheels heretofore made. Figures 2 and 3 are not claimed. There has always existed a difficulty in manufacturing the different shaped plate wheels heretofore made, on account of the contraction of the two plates towards each other in cooling, thereby pressing upon the core between the plates, rendering it necessary to remove the core from the wheel while hot, or endangering the wheel. It is a fact well known to iron-founders, that iron shrinks in cooling, and if a wheel is made with two plates, each convex outwardly, or one convex outwardly and the other undulating or concave, the plates, as they cool, straighten and contract the space between the plates, and press upon the cores; whereas, if the wheel is constructed with two plates, each concave outwardly, the straightening of the plates in cooling enlarges the space between the plates, thus receeding from the core of the wheel while hot, as in other forms. In using one straight and one concave plate in combination, the space is not enlarged as much about one-half. It operates on the same principle in cooling, but in a less degree.

What we claim as our invention, and desire to secure by letters patent, is the casting a car wheel of two plates of metal, of the form herein set forth, united to the rim and hub, the respective plates being concave outwards, curving from hub to rim, the object of which form is to cause the plates to contract uniformly, and to enlarge the space between the same at the weakest point, as the metal cools after casting, thereby enabling us to allow the core to remain in the wheel until it becomes perfectly cold. The core remaining in the wheel causes the same to cool slowly, having the effect to anneal and toughen the metal, as is well known to metallargists.

GEORGE W. SIZER,
HENRY SIZER.

Witnesses:
J. F. HOWLAND,
FREDERICK HANKS.

A model of which is herewith produced and marked.

Also testimony, tending to show that the wheel, for the making of which this action was brought, was made according to specification and drawing of their said patent; that their wheel was the result of invention, thought, skill, and experiment; that they commenced their efforts to produce their wheel as early as the month of March or April, 1846; that they continued making, drawing plans, sketches, and experiments, until the following winter; and that they offered five hundred dollars to any one who would invent a good wheel for them, and which would not infringe any existing patent.

The testimony of all the experts introduced by plaintiff and defendants, except three, tended to show that it would require thought and experiment to pass from the plaintiff's wheel to the defendants', and the testimony of all the experts tended to show that it would require thought and calculation so to do.

Also testimony tending to show that defendants' wheel had gone into use extensively; that they did not break or fracture in casting and cooling; that out of 1,500 or 2,000 sold by them, after they had perfected their experiments, but one wheel had been returned; that they were used under passenger cars as well as other cars and locomotives; that it is an improved and superior article, the result of the changes introduced.

The counsel for the defendants requested the honorable judge to instruct the jury as follows, to wit:

1st. That to maintain an action like the present, the plaintiff's patentees must have been the first as well as the true inventors of the thing patented; and if the same thing in substance and principle had been previously made, for the same purpose, completed ready for use, and disclosed to the public, whether the same had been put into public use or not, the plaintiff's patentees could not afterwards become the first inventors of the same thing. (Evans v. Eaton, Peters' C. C. R.,

322, 339, 342; Patent act of 1836, chap. 257, sec. 6, 7, 15; Pennock v. Dialouge, 2 Peters' R., 123; Washburn v. Gould, 3 Story R., 133.)

2d. That the last proposition is equally true in law as to any substantial and material part of the thing patented claimed as new, which in this case is the entire wheel. If the patent be for a whole machine, apparatus, or other thing, and for the whole combination, and a substantial and material part of such things, or of such combination up to a certain point, was before known and used in the same apparatus or implement in the same form, and applied to the same purpose, the patent would be for this reason void, the patentees not having disclaimed, within a reasonable time, what does not belong to them. (Patent act of 1836, sec. 15, 21; Evans v. Eaton, 7 Wheat. R. 430; Branton v. Hawks, 4 Barn. and Ald., 541.)

3d. That each of the last above two propositions are equally true, so far as concerns the verdict in this cause, whether the patentees knew or did not know of the previous invention, discovery, or use therein specified. (Patent act of 1838, sec. 15, in 2 places; Evans v. Eaton, Peters' C. C. R., 342; S. C. on appeal, 7 Wheat. R., 367–8; Patent act of 1837, chap. 45, sec. 7.)

4th. That the said two propositions are also true, whether the things, parts, or combination claimed in the patent, and not new, had been patented to their previous inventor, or disclosed or abandoned to the public. (Patent act of 1836, sec. 15, in 2 places—see last clause of sec. 6; Phillips on Patents, 200; Evans v. Eaton, 7 Wheat. R., 367–8.)

5th. That the patentees were bound, as a condition to the validity of their patent, to specify and point out the part, improvement, or combination which they claim as their invention or discovery. This must be done on the face of the patent and specifications, and not by proof aliunde. Having failed to do this, their patent, being for an improvement, is void on its face for a defective specification. (Patent act 1793, chap. 55, sec. 3; Patent act of 1836, sec. 6; Dixon vs. Mayer, 4. Wash. C. C., 73; Evans v. Eaton, 7 Wheat., 430; Lowell v. Lewis, 1 Mason R., 182; Cross v. Huntley, 13 Ward R., 386; Webster's Patent R., 173.

6th. That the useful results proposed by the improvement patented are one of the considerations for the grant of the monopoly, and if all or any of these turn out in fact not to be produced, the patent would be void for what in fact is technically termed a false suggestion. (Morgan et al vs. Seward and al; Web. Pat. R., 187–8, 196–7.)

7th. That a patent is granted only for a useful invention or discovery, and that if the plaintiff's wheel is wholly useless, or dangerous to human life, whether it be otherwise wholly useless or not, the patent is for this reason void. (Patent act of 1836, sec. 6; Manton v. Parker, Davies' Patent Cases, 327.

And unless the court shall be pleased to order a nonsuit, or verdict

for defendants, on all or some of the preceeding grounds, the defendants' counsel prays the court to charge the jury, in addition to the *tenth* of the above legal propositions, as follows:

8th. That the plaintiff is limited to a wheel of the form exhibited in his drawing, having given in his specification no sufficient direction for construction of any other: if the jury be not so charged, they be charged that the plaintiff is limited to one which, from the specification and drawing alone, a mechanic of ordinary skill in making such wheels could construct, without study and invention or experiment, by simply following the specification. (Webster's Pat. R., 173, 180.

9th. That the plaintiff's claim opened in this cause being for the entire wheel and not for any of its parts, nor any combination; if the jury believe, from the evidence, that either the entire wheel, in substance and principle, or substantial and material parts of it, had been before known and publicly used in the same kind of implement, in the same connection, at least up to a certain point, and applied to a like purpose, then the patent is broader than the invention, and their verdict should therefore be for the defendants.

10th. That the plaintiff's patent being for an improvement only, the patentees were boound clearly to point out, in their specification, in what their improvement consisted; and if, from the evidence, the jury believed that their invention consisted, in fact, in the addition of a second like plate, or part of a plate, to the James, operating as a brace or otherwise, (no matter how useful such addition may have been,) yet no such improvement being mentioned and limited, nor in any manner alluded to in the specification, the patent is, for this reason, void, and their verdict should be for the defendants.

11th. In like manner, if the jury believe, from the evidence, that the invention of the plaintiff's patentees consisted, in fact, in merely changing the position and form of one of the plates of the Baldwin wheel, their verdict should, for the same reason, be for the defendants.

12th. That the only useful results proposed or mentioned in the specification of the plaintiff's patentees being an improvement upon cast-iron spoke wheels, and the peculiar form given to the plates, by which a solid hub and chilled rim might be united in one casting, without danger of fracture of the plates in cooling; if the jury, from the evidence, believe that the wheel patented was not an improvement on said spoke wheels, or could not be cast without danger of the fracture of the plates *and* cooling, then the patent must be deemed to have been obtained upon false suggestion, and for that reason to be void, and their verdict should be for the defendants.

13th. If the jury believe, from the evidence, that the plaintiff's wheel, as above defined, cannot be manufactured, sold, and warranted, by any mechanic or founder, without loss, and would not be purchased by those to whom its true character is known; or if they believe its public use is dangerous to property and human life; in either of

these cases it is not a patentable invention, and their verdict should be for the defendants.

14th. That the court instruct the jury, that upon the true construction of the plaintiff's patent, the claim of the patentees is for the whole described in the specification, except the chilled rim; that the patentees claimed the solid hub when cast in one piece with a chilled rim, and both the plates with their curvature, as a contrivance by which a solid hub could be so united with a chilled rim without danger of fracture, all which they claim as an improvement; and if the jury believe, from the evidence, that all of which the patentees were in fact the first inventors, was an added plate, or part or a plate, to a wheel previously in public use of the same general description, and thereby introducing the principle of a brace, no matter how usefully, then the patent is void: first, because it is broader than the invention; second, because this improvement is not pointed out and distinguished in the specification; and their verdict should be for the defendants.

15th. That each of the preceeding matters are equally true in law, and available without regard to whether the defendants' patent is valid or not, or, to the question of infringement.

16th. If the patent is a patent for a whole, not claiming particular parts or processes, as a solid hub, or chilled rim, the casting in one piece, or curved plates, or the like, the most favorable interpretation for the plaintiff, then, on the question of infringement, the rules of law applicable to combinations are in general to be applied, but with some distinctions more favorable to the defendants.

17th. To constitute an infringement of such a patent, the defendants' wheel, as a whole, must be the same with the plaintiff's.

18th. To constitute his wheel as a whole, the same whole with the plaintiff's, it must be combined and made up of the same essential parts, and substantially the same forms and arrangements, and operating in the same way; in other words, it must be shown that it is made by the same rule or recipe by which the plaintiff's is made, and that his recipe, followed out by a person of competent skill, will produce defendants' wheel.

19th. If, then, the defendants' wheel embodies or is combined of every part and thing which is embodied and combined in the plaintiff's but one, as the plates, but employs and combines or uses plates of a different form and make, and arranged and made to operate in a different way, the result being, as a whole, a better wheel, it is no infringement.

20th. It becomes necessary now, in applying these propositions, to determine, first, what are his plates; and on this it is submitted, that his plates are in law just what his specification, drawings, and model teach a skillful man to make, without setting down to experiment, to contrive, to think, to devise anything, and without resorting to his general

knowledge or skill for any purpose but to learn how to follow the particular rule or work in such specification contained.

21st. No plates are his plates which he does not teach how to make and arrange, and no plates which cannot be completely made and arranged by following the specification are an infringement of the patent, unless the deviations are trivial, frivolous, colourable, or fraudulent. (Webster, 182.)

22d. Defendants' plates are not made precisely and exactly according to the specifications and drawings of plaintiff's. There is no infringement, unless the imitation be so nearly exact as to satisfy the jury that the defendants attempted to copy the model, and to make some almost imperceptible variation for the purpose of evading the right of the patentee. (2 Brok., 309; Webs. 27.)

23d. If the proposition is disallowed, then if a practical mechanic or other person skilled in the art, of which car-wheel making is a branch, could not, by merely following the direction in the specification, of which the drawing is part, and without going beyond, and tasking in any degree his own ingenuity and invention, without making experiments or pursuing processes of thought or the like, without deserting or modifying the directions in the specification and drawings, or substitution, in preference thereto, the result of his own ingenuity or thought; if he could not thus, and would not thus produce our wheel, it is no infringement.

24th. If to pass from the wheel which the plaintiff's description would make, to the wheel we make, would require an exertion of thought, ingenuity, reflection, skill, to some extent, they are not the same wheels in the sense of the law. (Webs. 24.)

25th. If the difference in the form, construction, arrangement, and mode of operating of the plates in the two wheels, together with the effect and consequences thereof, taken together and viewed as a sum, may properly be deemed and declared considerable and important, as distinct from merely formal, trival, and colorable, there is no infringement.

26th. Differences of mere form, if it produce a better article, constitutes a defence to the allegation of infringement.

27th. If the mode of construction of the defendants' wheel is a substantial and independent invention, and not borrowed from the patent or wheel of the plaintiff's, it is no infringement.

28th. If the defendants' mode of construction or wheel is not borrowed from plaintiff's, and is a discovery and invention of defendants, not a mere spurious variation in form to conceal the borowing, it is not an infringement.

29th. If the defendants' plates, and an original invention of theirs not copied from the plaintiff's, and altered from his, for the purpose of evasion or concealment, and if the diversities between them and his are such as to require and to evidence some degree and exercise of invention or discovery of skill, thought, or experiment, and cannot

be made by following his specification and model by a person of skill, using his general knowledge, and the result a better wheel, there is no infringement.

30th. If the plaintiff's patentees, at the time of obtaining the patent, had invented or discovered the plates now in the defendants' wheel, their form, make, and arrangement, and intended to claim them, their specification is void for not describing them, if they are not so described that a skillful person may make them from the description, and by his general knowledge called in to execute the same, and if they had not then invented and discovered them, then the action cannot be maintained.

31st. If the plaintiff's claim extends beyond the specification and description in the patent, all colorable, specious, and merely formal variations therefrom, or mere mechanical equivalents thereof, it is void for uncertainty.

32d. The same prayer as in No. 31st, with the exception of the last five words, for which substitute "he fails to prove an infringement thereof, by reason of the uncertainty what is his claim or his wheel."

33d. If the defendents' wheel as a whole is a real and substantial improvement in comparison with the plaintiff's, the action cannot be maintained.

34th. The same prayer, with this insertion after the word plaintiffs, "and if this improvement is caused by such alterations, that after they are made, the defendants in their wheel do not retain and use any part or thing claimed by the plaintiff, and being of his original invention, which is the case if these alterations are substantial; if they are discoveries of defendants, not borrowed from the plaintiff, and require invention, and produce a better wheel, since the claim and alleged invention is of a whole only, the action cannot be sustained."

35th. There is a difference between the inventing a new machine and the improving an existing thing; and if the jury find, having regard to the wheels existing in and previous to 1837, that that wheel alleged to have been a discovery or invention of the plaintiff's, was an attempted improvement of an existing thing, and was effected by means of certain forms and arrangements of plates, and that the idea of substituting double plates for spokes was already known, and that wheels had already been cast with a plate and chilled rim and solid hub at once, with a provision against contraction by means of the shape of the plate, then the essence of the plaintiff's alleged invention is the union of certain forms and arrangement of plates, with other known parts, and by other known processes, and that it is competent for any other person to attempt an improvement of a wheel in the same way, that is, by the displacement of the plaintiff's forms and arrangement of plates, and the substitution therefor of other forms

and arrangement of plates; and if the plates in defendants' wheel differ in form and arrangement; if they are the result of real discovery, and not borrowed; if they cannot be made by a person of skill, following the plaintiff's directions, drawing, or model; and if their effect is a better wheel,—there is no infringement

36th. The patent of defendants is prima facie evidence against the plaintiff, and for the defendants on infringement.

37th. The burden of proof is on the plaintiff, upon the point of infringement.

38th. Increased utility is evidence, presumptively, of novelty.

39th. The plaintiff *do* patent a mode, or method, or rule of work, or the wheel made thereby; and this rule or method of work is the principle of the plaintiff's alleged improvement; and if the rule or method of work in defendants is different substantially, there is a difference of principle; and then to determine whether there is a substantial difference in the rule or method, and of course of principle, the jury will find whether it is borrowed from the plaintiff's required discovery, and made a better wheel.

40th. The materiality or immateriality of the changes in the wheels is for the jury, and depends on this: Whether those changes are original, require invention, and produce a better wheel; and if thus found material, there is no infringement.

41st. If a change of form or of proportion produces a new effect, it is a change of principle; and effect here means superiority in manufacture of the article produced.

42d. If the defendants' wheel as made does not rely on the rising and depression of the hub to overcome contraction, but on curvature from hub to rim, designing to retain the hub in its place, or practically retaining it in its place, there is in this a diversity in their construction, which, if productive of a better result, is or may be evidence of a patentable diversity, or a diversity not an infringement.

43d. The doctrine or dictum cited from the case of Gray v. James was there applied to a case of a new machine, not to the case of an improving of an old thing; and the whole cases, both in this country and England, have gone to this extent, that if there is change in form only, or change of form, or change of arrangement, which produces a better wheel, this is a distinct patentable invention, and no infringement.

44th. Although the court has ruled, that in a certain sense the plaintiff is not confined to the precise curve or form of his drawing, yet this means only that the plaintiff may prove a case of infringement, though the defendants have gone beyond that curve or form; but in order to do so, the plaintiff must prove that the change was not original, but borrowed; that it required no degree of invention, and produced no better wheel than his, as actually described. The comparison is, after all, with his actually described wheel, and the question will of substantial difference tested, as in all the prayers.

45th. That the question, whether plaintiff's and defendants' wheels are substantially the same, or substantially different, in their mode of operation and results, is a question for the jury.

46th. That greatly increased usefulness in the operation and results of such a wheel, consisting of like parts, is of itself evidence to the jury of a difference in principle.

47th. That if, by changing the form and proportions, a new effect is produced, and that effect is a manifest and great increase of usefulness, this is a change of principle, and that is a question for the jury.

48th. That the jury should inquire whether there is anything in the defendants' wheel that is not to be found in the plaintiff's, in substance and principle. If there is, then it is not an infringement of the plaintiff's patent, and their verdict should be for the defendants.

The court refused to give the instructions so prayed for; but his honor the judge instructed the jury, as follows:

Gentlemen of the jury: This is an action brought upon letters patent for an alleged violation. It is a question of property, alleged by both sides to be of great amount, directly and indirectly, and the earnestness with which it has been contested by the parties give abundant evidence of the sincerity of their conviction of its importance. Our duty is to decide it according to established rules and principles; to exercise our understandings according to the best light and all the light at our command, to ascertain the truth, the fact, and the law, and then to follow them out. It is a high responsibility, doubtless, which devolves upon us, and in discharging this high trust and solemn duty, it must be a relief to find that the sphere of our inquiries is narrowed, and that we are guided in our inquiries by a higher power; that higher power is the law of the land, as applied to the evidence offered, and received in the course of the trial. It is our province not to make the law, but to ascertain and administer it; and as it is a great relief to the court to have the determination of matters of fact left exclusively to the jury, so to you, gentlemen, it must be a relief that you are not called upon by your duty to decide what the law is, but are to take it from the court. Your oath is a condensed summary of your duty. You are to render a true verdict according to the law and the evidence given you: the law, as given you by the court; the evidence as given you here, in the presence of the parties, and open to their scrutiny.

I now proceed, gentlemen, to state to you the law, not proposing to go into any detail of the evidence, further than may be necessary to present the different points, and enable you to apply the evidence.

There are several things required by the patent laws of the United States to entitle an inventor to a patent. He must be the original and first inventor, and the thing patented must be useful.

The letters patent are prima facie evidence of both these points, and are sufficient, in the first instance, to entitle the party holding

them to maintain a suit for any infringement. Then, if the validity of the patent be contested, the burden of proof is on the defendant. In this instance, the defendants allege two grounds on which they say the plaintiff's patent is invalid. First, that the original patentees were not the first inventors. That though they might have been original, they were not the first. They must be the first as well as original inventors; for if the thing they produce existed before, they might have been ignorant of it; they cannot take and hold any exclusive right to what before was public property.

The first question, then, is one of priority of invention.

Several wheels have been produced and exhibited to you by the defendants, and it is for you to say whether any of them is substantially the same in principle as the plaintiff's; and if so, whether it existed before his patent. And here comes the question, what is the plaintiff's patent? He claims a thing as a whole. It is made up of several things or parts, but the claim, after all, is for a whole. In that whole are embraced the several things of which you have heard so much during the trial. The chilled rim, the solid hub, the two curved plates, all cast at once, and forming one substance, one thing, one manufacture, for one use. It is to be taken as a whole, and if you find that, as a whole, it existed before, then his claim is not valid.

Now it is necessary to look at the various wheels put in evidence.

First. The Elgar wheel, which is a patented article. It is not alleged that in substance this is the same as the plaintiff's, but it has been introduced to show that it has some of his features, and that he has borrowed from it some of his ideas. It has two plates, not of cast iron, but of wrought iron, which were screwed or bolted to the rim and hub. In these respects there is a difference between it and the plaintiff's wheel, and this difference is adverted to in the specification of the plaintiff himself.

But I ought, before going any further, to say to you, that when I state the peculiarities of these different wheels, or any other matters of fact, you are not to take the statement of fact from me. It is your exclusive privilege and duty to judge of all questions of fact.

Then, second, there is the Dunham wheel. Mr. Dunham himself has been on the stand before you. In his wheel he had double plates, to a certain extent, but they did not reach from the rim to the hub. Instead of continuous plates, he employed them only for a portion of the distance, and used spokes for the rest. If that does not constitute two plates, connecting the hub and the rim, then it is not substantially the same as the plaintiff's.

Another wheel is that by Baldwin. That, you will recollect, was a double plate cast-iron wheel. You will also remember, from the statements of the witnesses, that two only of them were cast, and then the manufacture of them was abandoned, because this wheel did not prove to be a good article. If, with respect to this wheel, you believe the evidence of the witness, Mr. Baldwin's foreman, who

superintended the casting, that the plates were not curved so as to embrace the principle of compensation—that is, if they had not such a form given to them as to allow of contraction without fracture in the process of cooling—if that was wanting in the Baldwin wheel, then it is not substantially the same as the plaintiff's.

Then, again, there is the Tiers wheel. The deposition of Mr. Tiers has been produced, and he states that his wheel had spokes or arms between his plates, and he says, that after trying experiments he abandoned the manufacture. Now, experiment alone is not sufficient to constitute priority of invention. The article must be completed for public use, and such result must be known, although it is not necessary that it should be actually used by the public. The question is, whether the thing patented was before known? The conception of the idea, and an attempt to produce it, ending in unsuccessful experiment, is not sufficient to defeat a subsequent patent.

Now, there is still another wheel offered in evidence—the James wheel. You will recollect that it has one convex plate, with nothing to prevent a sufficient contraction in cooling. The question is, does that wheel, with its single convex plate, contain all the material parts of the Wolf wheel?

The plaintiff alleges that he has introduced a second plate. If the second plate introduced by the plaintiff operates as a brace or truss to support the rim and hub, and thus introduces a new principle or mechanical power, then the plaintiff's is not substantially the same as the James wheel.

These are all the single and separate wheels introduced by the defendants. I have adverted to them very briefly, but you will remember, doubtless, all the peculiarities of their construction and principle.

But then comes the second question: If neither of these wheels, taken separately, will defeat the plaintiff's patent, will they *altogether?* It is contended by the defendants that all the parts going to constitute the plaintiff's wheel were known before, and developed in prior wheels.

But if the patentee borrowed the idea of the different parts which go to constitute his wheel, and for the first time brought them together into one wheel, and that whole is materially different from any whole that existed before, then he is the original and first inventor, and is entitled to a patent therefor.

I have been requested to instruct you that it is of no consequence, as to the validity of a patent, how much or how little labor, study, or thought the invention cost. And, gentlemen, this is so; if it be really a new and useful invention, the degree of labor and thought may be sometimes evidence to the jury upon the question of invention; but although the invention be accidental, or a sudden flash of thought, the party is entitled to the benefit of his discovery.

I have also been requested to state, that it makes no difference, as to the validity of a patent, if the same article or production was known

before, whether such prior production or article was patented or not. And such, undoubtedly, is the law, as you must have seen from the directions already given you.

The next question which arises is that of utility. The statute requires the invention to be useful. The law does not say that it must be highly useful, or more useful than others. It must have some degree of utility, and that is all that is required.

I have been requested to instruct you, that an article cannot be considered useful if it endangers human life, or is so expensive that manufacturers would not be induced to make it. Those may be very important considerations for you to take into view, but they are not necessarily conclusive, and you will determine, from a consideration of all the evidence, whether the invention is upon the whole a useful one.

Another question is, whether the description given in the patentees' specification is sufficient to enable a skillful artisan to make the wheel from it? The description must be such as to enable a person skilled in the art, to which the invention pertains, to make the thing patented in such a manner that it will be useful.

I next proceed to another, and perhaps, I may say, the great question in this case, which has been argued very ably by the counsel on both sides; it is, whether the defendants have infringed the plaintiff's patent?

Now the defendant himself has a patent for his wheel, and that patent is prima facie evidence that the wheel is his invention; that it is new and original in him, and the burden of proof is on the plaintiff, to satisfy you that the defendant has infringed his patent. The defendants' patent being subsequent, cannot operate to defeat the plaintiff's, if it be substantially for the same thing. The question is, whether the article actually made by the defendants is substantially the same as that patented by the plaintiff? There is no dispute as to what is actually made by the one party and by the other. The things or the productions of both the plaintiffs and defendants are before you as they have been actually constructed. You have the means of comparing them. The burden of proof, as I have said in this respect, is on the plaintiff. He must prove beyond a reasonable doubt, that the defendants have infringed his right; and the question is, whether the article made by the defendants is substantially the same as that of the plaintiff? This is a matter of fact, and exclusively for your determination.

But here it becomes necessary to ascertain with more precision what is claimed and secured by the plaintiff's patent.

It is insisted, on the part of the defendant, that the plaintiff is restricted to the degree of curvature described in the drawing annexed to his specification; but the drawing is only an illustration, and the patentee is not limited to the degree of curvature therein represented. The plates are described in the plaintiff's patent as convex; and the

question is, whether they must be curved as wheels, that is, from rim to rim, or whether the curvature may be between hub and rim? It is contended by the plaintiff, that the drawing shows that the inner plate is struck from two centres, making some degree of curvature between hub and rim, subordinate to the general convexity. If this be so, and the curvature of the arms of some cast-iron wheels was previously well known to be between hub and rim, then I instruct you, that the plaintiff is not confined to curvature between hub and rim, but that curvature between hub and rim is within his patent.

Another question relates to the arrangement of the plates. In the plaintiff's specification, they are described as parallel, or nearly so, and the summing up states them to be one convex outwards, and the other inward; and it is insisted by the defendant, that the plaintiff is confined to that arrangement; but I feel bound to instruct you that such is not the law, and that the plaintiff is not restricted to plates that are curved or convexed in the same direction, but that his patent may cover plates both curved inward, or both curved outward, as well as those which are parallel, or nearly so.

Taking these views of the plaintiff's patent, you will come to the examination of the wheel made by the defendants, and see whether it is substantially the same. If the defendants have omitted any one material part found in the plaintiff's wheel, then their wheel is not the plaintiff's, and is not an infringement. They allege that they omit altogether the plates of plaintiff, and substitute others materially different; and that is a question for you to examine and decide.

It is contended by the defendants, that if a person of competent skill could not, from the description given by the plaintiff, make a wheel like the defendants, then that the plaintiff cannot prevail in this action.

And this proposition is true when properly understood. It is not necessary that one skilled in the art should be able, from the plaintiff's description, to make a wheel in the form of the defendants, but it is necessary that he should be able to make one substantially like the defendants; for if he could not, it would follow, either that the thing patented could not, from the description given by the patentee, be made by a person of competent skill, or that, when made, it would be substantially different from the defendants; and in such case the plaintiff could not maintain this action; but this still brings us back to the question, whether the defendants' wheel is substantially the same as the plaintiff's.

The defendants have introduced certain changes in the plates and their arrangement. If these are only changes of form and proportions of the thing patented, as described and set forth in the patent, without introducing any new principle or mechanical power, or new mode of operation producing a new kind of result, the defendants' wheel would, notwithstanding these changes, be an infringement of the plaintiff's patent; but if by such changes of form and arrange-

ment, the defendant has introduced any new principle, or mechanical power, or has introduced a new mode of operation, producing a new kind of result, he has not infringed the plaintiff's patent.

If the changes made by the defendant have rendered his wheel one of greater utility than the plaintiff's, such utility is evidence that some new principle, or mechanical power, or new mode of operation, producing a new kind of result, has been introduced; and the greater such utility the stronger is such evidence; and if a manifest and very high degree of utility is obtained by such changes, it becomes full proof and conclusive, that a new principle, or mechanical power, or new mode of operation, producing a new kind of result, has been introduced, and that the defendants' wheel is no infringement.

There has been much evidence before you upon these points. You have the opinions of gentlemen of science and skill, of experts *coversant* with this particular art upon this question, and also many detailed facts from those acquainted with the operation of the two wheels. You are to decide upon all this matter, by exercising your own judgment upon the facts and reasonings submitted to you. You have another kind of evidence, upon which you are also to pass; and that is, the proof of the effect of both these productions when put to practical use.

Now, gentlemen, the opinion of experts, contrary to the general principles of law, which exclude opinions from going to a jury as evidence, is admissible in cases like this. Cases involving questions of science and artistical skill, in which it is presumable that the jury are not versed, and with regard to which, therefore, they may desire the aid of other persons skillful and versed in the art or science in question—hence it is, that the results which skillful and accomplished persons have arrived at in their own minds are suffered to go to the jury as matters of evidence. But they are not to be held as conclusive. They are to be judged of by you, and weighed by you, in the same manner as all the other evidence in the case.

And with regard to this matter, the plaintiff insists that the weight of evidence from the experts is on his side. The defendants, on the other hand, contend that it is clearly on theirs. It is for you to examine the testimony, and consider which side is entitled to be regarded as having the preponderance.

It is insisted also by the defendants, that the plaintiff's experts have given an explanation to the meaning they attach to the term "principle," which destroys the force of the opinion they have given as to the defendants' wheel being the same in principle with the plaintiff's, because they say it might require skill, ingenuity, thought, and experiment to arrive at the defendants' wheel from the plaintiff's description.

Now, it may be that thought and experiment would arrive at something substantially different from the plaintiff's, and it may be that they would produce an article substantially the same, though formally

different. And it may be, again, that much ingenuity, thought, experiment, and study may be employed to prevent a similitude in form, although the principle be the same, and so evade the patent.

Besides the opinions of the experts, you have the reasons given by them for such opinions, and the theories and deductions argued by counsel.

All agree that in casting a wheel in a chill, the first effect is a contraction of the rim, diminishing the circumference of the wheel, and thus producing a pressure upon the plates, which, in their heated state, causes them to yield, so as in the first instance to increase the curvature, and afterwards, by the cooling of the interior, the *curature* is reduced so as to be somewhat nearer a straight line than it was originally. The defendant contends that by the contraction of the rim in the chill, the hub of the plaintiff's wheel rises, and that in the defendants' it does not; and that this constitutes a material difference between them.

The plaintiff insists that the hub of the defendants' wheel also rises by the contraction of rim in casting, and that, if it were otherwise, still that would constitute no difference of principle. That the hub or centre of the plaintiff's plates rises, in the first instance, in the process of casting, there is no doubt, although at first it was controverted; is it the same with the defendants'? To this point you have the testimony of persons who have cast the wheels, and of others who have made the experiment for the purpose of determining the question, and models prepared with screws for the purpose of illustrating the effect of the first contraction in casting the two wheels, and also the testimony and reasoning as to the necessary effect of the pressure by such contraction upon the plates of the form used by the defendants.

It is urged by the plaintiff, that although most of the curvature in the defendants' wheel is between hub and rim, yet that there is what may be denominated a general curvature between rim and rim, and that this last curvature is in the same direction in both plates, so that when the contraction of the rim presses upon the mass of metal constituting the plates, such pressure is not in a straight line between rim and rim, and therefore the centre of both plates is necessarily pressed upwards, in a greater or less degree, although a part of such pressure may be exhausted upon the subordinate curves between hub and rim. The defendant, on the other hand, insists that there is no such general curvature, and the only effect of contraction of the rim is to increase the curvature between hub and rim. It is for you to determine, upon all the evidence, whether there be a difference in this respect between the two wheels; and if so, whether it be material.

The curvature of the plates is also necessary, and perhaps even more important, to obviate the danger arising from the contraction of the interior portions of the wheel in cooling, which diminishes the

curves, and eventually renders them somewhat less than they were as originally moulded.

There is no doubt that in this process the hub or centre of the plates is depressed; but it is controverted whether such is the effect upon the defendants' plates. And upon this point, as well as upon the question of its materiality, you have the same evidence as upon the effect of the first contraction by chilling the rim.

Then, gentlemen, there is another question. It is said that the defendant obtains a distinct advantage, to which, indeed, his patent particularly adverts, by relieving the core in casting, so that it need not be removed until the metal is cold. There is no evidence that the core of the plaintiff's wheel was in fact ever removed until it was cold, or that its remaining in has proved injurious. But it is urged by the defendent that some injury must have necessarily resulted, because from the form of the plaintiff's wheel the whole space between the two plates is at first filled by the core, and that this space, being diminished by contraction in cooling, causes an injurious pressure; whereas the effect of the same contraction upon the defendants' plates would be to increase the space between them, and thus relieve the core. This is denied by the plaintiff, who insists that the first contraction diminishes the space between the defendants' plates much more than any part of the process does the space between the plaintiff's.

(His honor here illustrated to the jury the different effects of the the antecedent subsequent contractions of the metal of the rim and plates in cooling, as affecting the core, by means of the sectional model of the two wheels.)

There is another distinct species of evidence worthy of your deliberate consideration; and that is, the practical effect produced by the changes introduced by the defendant.

If the effect is a wheel of greater utility, that is evidence tending to show that some new principle or mechanical power, or mode of operation, producing a new kind of result, has been introduced; and the higher the degree of utility, the stronger is such evidence, and it may rise to so high a degree as to become conclusive.

From our inability to penetrate the secrets of nature, we may not be able to detect the new principle or power otherwise than by its effects; but this utility must be derived from the changes introduced, not from the use of better material, or greater skill or care in the manufacture.

Under this head, your first enquiry will be, whether the defendants' wheel is in fact superior to the plaintiff's; and if you find that it is, you will next consider whether such superiority is attributable to the changes introduced by the defendant, or to better material and greater care and skill, or partly to one and partly to the other, and how much to each.

It is in evidence that about 1,100 wheels were made by the patentees from the date of their patent, in 1838, to the year 1843, which were

put upon the Pennsylvania railroads, and that some two hundred of them still continue in use.

And the plaintiff, moreover, insists that railroads, as they were constructed ten years ago, gave a more severe trial to the wheels than they do as now built. It is further urged by him that if any wheel has stood the test of long use, that fact should satisfy you that the article is a good one.

And it is maintained, if one wheel can be made from a particular pattern to stand the test of severe use, another wheel, or any number, can be made from the same pattern, equally good, with sufficient care and skill.

On the other side, it is insisted that the Wolf wheels, as they were constructed, were bad; that they broke, and were in fact a worthless article; and that no one ever made a second purchase of them, but that the old spoke wheels were always substituted for those that failed; and that, with respect to the two wheels exhibited to you as having been run for several years, nobody knows to what use they were put, nor to what trial they were subjected. And again, it is added that the patentees abandoned the manufacture of the Wolf wheel, and went back to the old cast-iron spoke wheel. This, the defendant contends, is of itself evidence which should satisfy you that the Wolf wheel is worthless. On the other hand, you have the deposition of Mr. Wolf himself, stating that the only reason why he abandoned the manufacture of his wheel was, that he could not procure the proper kind and quality of iron. With regard to the several periods of this wheel, as the counsel have designated it for convenience, it appears that in 1847 the plaintiff himself, at Albany, employed Messrs. Jagger, Treadwell, & Perry to manufacture his wheel under his own supervision. The defendant contends that the attempt was a failure. The plaintiff contends that it was successful.

One party says that the manufacture was given up because it was not successful, and because the wheel was not useful. The other maintains that that was not the reason for discontinuing the manufacture, but the reason was the want of suitable material. You had the testimony of both sides before you upon this point. On the one hand, it is insisted that the most perfect opportunity was afforded for a successful production of the plaintiff's wheel; that the utmost care and skill was used in making it; and that the very best of material was employed; and that this, too, was under, frequently, the personal inspection of the plaintiff. But the other side contend that the testimony of the witnesses to these things should be taken with much allowance, especially so with regard to the evidence of Mr. Treadwell, who occupies an antagonist position to the plaintiff.

Mr. Treadwell is the defendant at Albany, in a suit brought for an infringement of this very patent, and standing in that position, it is urged that he has such an interest in the question, although not in this suit, that he must be biassed.

Mr. Kibbe, too, being in his employment, it is said, must be also under a bias; but then, on the other hand, it is stated that the plaintiff complained to the manufacturers of the quality of the iron used, and it was changed at his request.

As to the quality of the iron, gentlemen, and the allegation that Treadwell & Co. did not use a proper material, you have the testimony of several witnesses, who state that in the wheels made in 1847, or at least in that specimen of them which you have seen in the entry of the court-room, the iron was not of a suitable quality for railroad wheels. You will satisfy yourselves, in the first place, whether the plaintiff manufactured a good wheel or not; and, in the second place, whether, if the manufacture did not turn out to be good, the fault was owing to the form of the plates or the inferiority of the material employed. And you are to judge in the same way concerning the defendants' production. You are to look at the tests by which it has been tried; the use to which it has been subjected; the number called for and made; and the various other circumstances in the case, which it is not here necessary to recapitulate. The witnesses from Springfield, produced by the defendants, have testified that some two thousand Sizer wheels were manufactured and sold for use upon railroads, and that they have not known any of them to be returned. On the other hand, it is contended by the plaintiff, that with the present improved mode of constructing railroads, the strain or test of car wheels is now not nearly so severe as it formerly was; and, moreover, in fact, that several of the Sizer wheels used upon the Old Colony road have failed. All this is matter for your consideration.

I have been requested by the defendants to instruct you that the plaintiff's specification or description must be so clear and intelligible as to enable an artisan to make the patented wheel without any new invention or exercise of inventive power. This is so; but you must understand that it is only required of an inventor so to describe the article for which he seeks a patent, as that a person skilled in the particular art relating to it can construct the fabric from the description, by the exercise of his skill as an artisan; not that it must be so described, that a person unacquainted with, or unskilled in the art, may be enabled to produce it.

The only other question, gentlemen, in this case, is that of damages. If your verdict should be in favor of the defendants, this question will not arise; but if you should be of opinion that the plaintiff is entitled to a verdict, you will have to determine the amount, which would be such as would indemnify the plaintiff for the injury he has sustained from the defendants' violation of his patent.

The number of wheels which the defendant has made, and the amount of profit he has realized from them, have been presented to you by the plaintiff, as grounds of damages. They are proper to be taken into consideraton, but are not conclusive as to the extent of the injury, which may be either greater or less than the profits rea-

lized by the defendants. A plaintiff may be manufacturing his patented article himself, and making it to a profit, while another man may make it to a disadvantage; and yet the spurious article carried into the market may displace the original. In such case, the injury to the patentee may be greater than any profit upon the spurious production. On the other hand, a defendant's article may not displace the original, and in that case the injury would be less. And again, it may be that a plaintiff would derive a profit from licensing other parties to construct his invention, and any piracies upon it, by depriving him of a portion of the profits of such licenses, would be an injury to be taken into account by a jury. If your verdict should be for the plaintiff, he is entitled to damages to the full extent of the injury he has sustained from the wrongful acts of the defendants.

To which refusal of the court to give the said instructions prayed for, and also the instructions of the court given as aforesaid, the said defendants at the trial excepted, and prayed that this their bill of exceptions be signed and sealed by his honor the judge; all of which being found true, the same is accordingly signed and sealed.

In testimony whereof, I have hereunto set my hand and seal.

(Signed) PELEG SPRAGUE, [L. S.]
Judge of the U. S. Mass. District.

Attest: J. B. ROBB, *Clerk.*

UNITED STATES OF AMERICA,
District of Massachusetts, ss:

At a circuit court of the United States for the first circuit, begun and holden at Boston, within, and for the district of Massachusetts, on Monday, the sixteenth day of May, in the year of our Lord, one thousand eight hundred and fifty-three, (the fifteenth day of said May being Sunday.)

Before the honorable Benjamin R. Curtis, associate justice of the supreme court of the United States; and the honorable Peleg Sprague, district judge.

Circuit Court of the United States, Massachusetts district, ss.
May term, 1853.

WILLIAM V. MANY
vs.
GEORGE W. SIZER and al.

And now the plaintiff's counsel comes and presents to the court here the mandate of the Supreme Court of the United States, issued in this cause on the first Monday of December, A. D. 1851, and filed in this court on the twenty-third day of November, A. D. 1852,

in the said October term of this court; which mandate is in the words and figures following, viz:

UNITED STATES OF AMERICA, *ss:*

[L. S.] The President of the United States of America to the honorable the judges of the circuit court of the United States, for the district of Massachusetts, greeting:

Whereas, lately in the circuit court of the United States, for the district of Massachusetts, before you, or some of you, in a cause between William V. Many, plaintiff, and George W. Sizer and Henry Sizer, defendants, the judgment of the said circuit court was in the following words, viz:

It is thereupon considered by the court, that the said William V. Many recover against said George W. and Henry Sizer the sum of seventeen hundred and thirty-three dollars and seventy-five cents damages, and costs of suit taxed at , as by the inspection of the transcript of the record of said circuit court, which was brought into the Supreme Court of the United States, by virtue of a writ of error, agreeably to the act of Congress in such case made and provided, fully and at large appears.

And whereas, in the present term of December, in the year of our Lord one thousand eight hundred and fifty-one, the said cause came on to be heard before the said Supreme Court, on the said transcript of the record, and was argued by counsel; in consideration whereof, it is now here ordered and adjudged by this court, that the judgment of the said circuit court in this cause be, and same is hereby affirmed, with costs and damages at the rate of six per centum per annum, and that the said plaintiff recover against the said defendants eighty-nine dollars and seventy-eight cents for his costs herein expended, and have execution therefor.—Jan. 15.

You, therefore, are hereby commanded that such execution and proceedings be had in said cause as, according to right and justice and the laws of the United States, ought to be had, the said writ of error notwithstanding.

Witness the honorable Roger B. Taney, chief justice of said Supreme Court, the first Monday of December, in the year of our Lord one thousand eight hundred and fifty-one.

Costs of plaintiff.

Clerk	$69 78
Attorney	20 00
	89 78

Taxed by

(Signed) WM. THOS. CARROLL,
Clerk of the Supreme Court of the United States.

2043.

And the plaintiff's counsel further presents to the court here the bill of the plaintiff's costs in the said action accrued prior to the rendering of the judgment recited in the said mandate, at the October term of this court in the year 1848, which bill, taxed by the plaintiff's attorney, according to the 41st rule of this court, is in the words and figures following:

UNITED STATES OF AMERICA,
CIRCUIT COURT UNITED STATES,
Massachusetts district, ss:

October term, 1848.

WILLIAM V. MANY
vs.
GEORGE W. SIZER et al.

Plaintiff's costs.

Writ, &c., October term, 1848		$3 15
Service		248 75
Entry		1 25
Travel		2 64
Attendance, 85 days		28 05
Attorney fee		2 50

Depositions (as per certificate on file.)

John Fred'k Houslin, commissioner		76 15
James B. Robb		55 00

Marshal's fees (as per subpœnas on file.)

Serving writs		63 85

Witnesses' fees (as per certificates on file.)

James Wilhalland:		
Travel, 786 miles, at 05	$39 30	
Attendance, 15 days, at $1 25	18 75	
	58 05	58 05
J. B. Allen:		
Travel 200 miles	$10 00	
Attendance 5 days	6 25	
	16 25	16 25

Josiah C. Young:		
Travel 88 miles	$4 40	
Attendance 5 days	1 25	
	5 65	$5 65
W. Raymond Lee:		
Travel 2 miles	$0 10	
Attendance 8 days	10 00	10 10
	10 10	
D. N. Pickering:		
Travel 2 miles	$00 10	
Attendance 16 days	20 00	
	20 10	20 10
Otis Tufts:		
Travel 2 miles	$00 10	
Attendance 12 days	15 00	
	15 10	15 10
Albert Stewart:		
Travel 300 miles	$15 00	
Attendance 1 day	1 25	
	16 25	16 25
Bobert Bragg:		
Travel 2 miles	$00 10	
Attendance 3 days	3 75	
	3 85	3 85
George S. Griggs:		
Travel 4 miles	$00 20	
Attendance 13 days	16 25	
	16 45	16 45
N. B. Starbuck:		
Travel 402 miles	$20 60	
Attendance 8 days	10 00	
	30 60	30 60

Amount carried over		$673 74
Amount brought over		673 74
John B. Clute, jr.		
Travel 432 miles	$21 60	
Attendance 21 days	26 25	
	47 85	47 85
Addison Low:		
Travel 400 miles	$20 00	
Attendance 21 days	26 25	
	46 25	46 25
Jeffrey Smedley:		
Travel 834 miles	$41 70	
Attendance 21 days	26 25	
	67 95	67 95
John S.		
Travel 476 miles	$23 80	
Attendance 17 days	21 25	
	45 05	45 05
J. F. Rogers:		
Travel 412 miles	$20 60	
Attendance 17 days	21 25	
	41 85	41 85
John A. Hook:		
Travel 834 miles	$41 70	
Attendance 21 days	26 25	
	67 95	67 95
E. J. Snuder:		
Travel 834 miles	$41 70	
Attendance 21 days	26 25	
	67 95	67 95

W. F. Shattuck:		
Travel 420 miles	$21 00	
Attendance 21 days	26 25	
	47 25	47 25
Geo. F. Frazers:		
Travel 720 miles	$36 00	
Attendance 12 days	15 00	
	51 00	51 00
D. M. Clintock:		
Travel 720 miles	$36 00	
Attendance 21 days	26 25	
	62 25	62 25
G. Matlock:		
Travel 720 miles	$36 00	
Attendance 21 days	26 25	
	62 25	62 25
Jordan S. Mott:		
Travel 492 miles	$24 60	
Attendance 21 days	26 25	
	50 85	50 85
J. B. Tyler:		
Travel 200 miles	$10 00	
Attendance 17 days	21 35	
	31 35	31 35
J. C. Rockwell:		
Travel 200 miles	$10 00	
Attendance 21 days	26 25	
	36 25	36 25
Samuel Pierce:		
Travel 412 miles	$20 60	
Attendance 21 days	26 25	
	46 85	46 85

4045.

James Mengyor, jr.

Travel 498 miles	$24 90	
Attendance 21 days	26 25	
	51 15	51 15

Amount carried forward	1,497 79
Amount brought forward	1,497 79

James E. Marble:

Travel 400 miles	$20 00	
Attendance 21 days	26 25	
	46 25	46 25

Jeremiah D. Greene:

Travel 412 miles	$20 60	
Attendance	26 25	
	46 85	46 85

James Dougherty:

Travel 834 miles	$41 70	
Attendance 21 days	26 25	
	67 95	67 95

James W. Crane:

Travel 200 miles	$10 00	
Attendance 25 days	31 25	
	41 25	41 25

B. A. Woodworth:

Travel 2 miles	$00 10	
Attendance 6 days	7 50	
	7 60	7 60

Samuel L. Cummings:

Travel 2 miles	$00 10	
Attendance 3 days	3 75	
	3 85	3 85

Henry A. Robinson:		
Travel 2 miles	$00 10	
Attendance 2 days	2 50	
	2 60	2 60
Warren Gove:		
Travel 2 miles	$00 10	
Attendance 3 days	3 75	
	3 85	3 85
Joel A. Wood:		
Travel 2 miles	$00 10	
Attendance 3 days	3 75	
	3 85	3 85
Isaac Adams:		
Travel 2 miles	$00 10	
Attendance 21 days	26 25	
	26 35	26 35
Edgar W. Bray:		
Travel 30 miles	$1 50	
Attendance 2 days	2 50	
	4 00	4 00
Thomas Blanchard:		
Travel 2 miles	$00 10	
Attendance 21 days	26 25	
	26 35	26 35
Clerk's fees paid J. B. R. (as per certificate on file)		18 05
Due T. O. B., taxing, recording, &c.		15 00
		$1,811 59

Taxed by

C. P. CURTIS, jr.,
Plaintiff's attorney.

August 20, 1852,
Examined by

ISAAC O. BARNES, *Clerk.*

And thereupon the said plaintiff's counsel moves the court that an allocation be granted upon the said bill of costs, pursuant to the rule aforesaid, and that the clerk be directed to insert the amount thereof in the judgment aforesaid.

And the said plaintiff's counsel further moves that execution issue upon the judgment aforesaid, for the amount of the damages therein recovered, being the sum of seventeen hundred thirty-three dollars seventy-five cents, with six per cent. interest thereon from the time of rendering the said judgment to this fifteenth day of May, A. D. 1853, being the further sum of four hundred twenty-four dollars seventy-seven cents; together with the costs aforesaid, to wit: the sum of eighteen hundred and eleven dollars fifty-nine cents; and the costs in the said mandate mentioned, being the further sum of eighty-nine and seventy-eight cents.

GEO. T. CURTIS,
Of Counsel for the Plaintiff.

Damages	$1,733 75
Interest	424 77
Costs in Circuit Court	1,811 59
Costs in Supreme Court	89 78

And now, upon the 28th day of May, 1853, the premises being seen and duly considered by the court, the foregoing motion was granted, and execution ordered to issue "*nisi*," which order is in the words following, to wit:

WILLIAM V. MANY
vs.
GEORGE W. SIZER.

May 28, 1853.

And the said Sizer et al., by their counsel, objected to the granting of the said motion for an allocatur as to the said costs, or to their being inserted in the judgment, and claimed and requested that if the court should allow the said costs, and direct the clerk to insert the amount in the record of said judgment, then the defendants should have a right to sue out a writ of error, and for that purpose, that the court here should either certify that it is reasonable that there should be such writ of error, or should add interest upon the amount of said costs from the time of the rendition of the original judgment to the present time, so as to make the amount more than two thousand dollars, and that no execution should issue if, within ten days, a writ of error should be sued out, and security given according to law; to which claims and requests made by the defendants the plaintiffs objected, and insisted upon the said motion.

And now the court having considered the said motion filed by the plaintiff, and the objections, claims, and requests made by the defend-

ants, and deeming it to be the legal right of the plaintiff to have the said costs allowed, and the amount thereof inserted in the original judgment in this cause, and that it is not within the discretion of the court to allow or disallow the same, it is ordered by the court that the said costs, as taxed in said motion, be allowed, and that the amount thereof be inserted in the original judgment in this cause.

And the court here doth deem it reasonable that the said defendants should be allowed to bring a writ of error to the Supreme Court; and it is further ordered by the court, that execution, as prayed for in said motion of the plaintiff, shall issue after the expiration of ten days, Sundays exclusive, from the making of the order, unless the said defendant shall, within said ten days, give security according to law, and serve a writ of error, by leaving a copy thereof for the plaintiff, in the office of the clerk of this court; and if such security should be given, and such service made within ten days, then that execution should not issue until the further order of the court.

By the court,

H. W. FULLER, *Clerk.*

And afterwards, to wit: on the eighth day of June, A. D. 1853, a writ of error was sued out in this case, returnable to the Supreme Court of the United States, to be holden at Washingten, on the first Monday of December next; and on the ninth day of said month of June, the said plaintiffs in error filed in the clerk's office a bond, with sureties, to prosecute their said writ with effect; which bond was, on the same day, approved by the court as good and sufficient security therefor; and thereupon, to wit: on the same day, the said writ of error was signed and allowed by the district judge, and a copy thereof was filed in the clerk's office; and on the same ninth day of June, a citation was issued thereon in the words following, to wit:

UNITED STATES OF AMERICA,
Massachusetts district, ss:

To William V. Many, of Albany, in the State of New York, greeting:

Whereas, the circuit court of the United States, for the first circuit and district of Massachusetts, on the twenty-eight day of May, A. D. 1853, made a final order and judgment in a certain action in law then pending therein between you, as plaintiff, and George W. Sizer and Henry Sizer, of Springfield, in the said district, defendants; which final order and judgment the said defendants desire to have re-examined by the Supreme Court of the United States, and have sued out this day a writ of error thereon, returnable to the said Supreme Court of the United States, and filed sufficient security, as by law required; and said writ of error has been allowed by the said circuit court.

Now, therefore, you are hereby notified of the said writ of error,

and of the allowance thereof; and you are hereby cited to appear, if you see cause, at the said Supreme Court of the United States, next to be holden at Washington, on the first Monday in December next, (1853,) to make answer thereto, and to show cause, if any you have, why the said order and judgment should not be reversed.

Given under my hand and seal, this ninth day of June, anno Domini one thousand eight hundred and fifty-three.

P. SPRAGUE, [L. S.]
Judge of the United States for the District of Massachusetts.

Due service of which citation appears by the following return of the U. S. marshal, endorsed upon the original:

UNITED STATES OF AMERICA,
Massachusetts district, ss.

Boston, October 2, 1853.

I hereby certify, that I this day notified William V. Many, the plaintiff named in the foregoing citation, of the writ of error therein referred to, and the allowance thereof, and cited him to appear, if he see cause, at the Supreme Court of the United States, next to be holden at Washington, on the first Monday of December next, (1853,) for the purposes therein stated, by giving in hand to George T. Curtis, esquire, his attorney of record in the cause in said citation mentioned, said Many not being in my district, nor having any last or usual place of abode therein, a true and attested copy hereof.

WATSON FREEMAN,
U. S. Marshal.
J. H. RILEY,
Deputy Marshal.

Service	$2 00
Travel 440 miles	26 40
Cap	30
	$28 70

I, Henry W. Fuller, clerk of the circuit court of the United States, Massachusetts district, do certify, that the foregoing is a true copy of the record, and of all proceedings in the said circuit court, in the cause of William V. Many, plaintiff, vs. George W. Sizer and Henry Sizer, defendants.

In testimony whereof, I have hereunto subscribed my name, and affixed the seal of the said court, this twenty-first day of [SEAL.] November, A. D. eighteen hundred and fifty-three, and of the independence of the United States the seventy-eighth.

H. W. FULLER, *Clerk.*